Definition of Transit Needs

INTRODUCTION

It is important to establish common definitions to use in assessing and reporting transit needs and demand. Transit needs should be differentiated from transit demand. Demand is not the same as need. The need to travel, however defined, exists whether or not passenger transportation service is available. Demand is defined as the number of passenger-trips that will be taken when a given level of passenger transportation service is available. Demand and need are measured as passenger-trips or one-way trips on a vehicle from one point to another. Round-trips are counted as two one-way passenger-trips.

It is difficult to develop a precise quantification of transportation need since whether a specific trip needs to be made is a subjective evaluation of individual travelers. Since persons with ready access to an automobile have few constraints on their ability to make trips, the trip generation rates of auto-owning households may be assumed to reflect a generally unconstrained measure of the need and desire for travel.

Ideally, if transit services were ubiquitously available, free and direct, observations would show an equal number of trips per household regardless of the mode, transit or automobile. This is, however, not the case. In the vast majority of cases, transit services are not instantly available nor does the service typically fit one's exact travel requirements. Typically there is a wait time for the service, often the trip takes one close but not exactly to where one is going, or the trip requires transfers which, more likely than not, involve an extended wait time. Due to the travel barriers inherent in transit, the actual trip generation rates for households dependent on transit are lower than the rates observed for non-transit-dependent households.

The study of rural trip generation, conducted as part of the TCRP B-3 project, yielded nationwide data on the quality and quantity of transit service in rural areas as well as data on transit system use (annual trips), stratified by traveler characteristics. These characteristics included information about age, income, and mobility-limitation status. In addition, information was collected on the services available in rural counties. Service information included the amount of service provided (measured in terms of annual vehicle-miles), the size of the service area (measured in square miles), the type of service provided (demand-response, fixed-route), and the number of trips served (annual unlinked trips).

On a county-by-county basis, relationships between trips consumed and service provided were defined. This information was used to derive predictive equations, which relate service area and readily available population data with transit service level data to yield estimates of travel demand for program and non-program-related transit services. Program-related trips are those trips made by participants of a specific human or social service program, such as senior nutrition or occupational therapy. These trips would not be made but for the existence of the program. The number of these trips is directly dependent on program enrollment. On the other hand, non-program trips are those trips that are more reflective of general public transit service.

MOBILITY GAP METHODOLOGY

The mobility gap methodology identifies the amount of service required in order to provide equal mobility to persons in households without a vehicle as for those in households with a vehicle. The trip rates for households with vehicles serve as the targets for those households without vehicles.

Household Trip Rates

Household daily trip rates are taken from the 1995 National Personal Transportation Survey (NPTS) data and are generated for households with and without automobiles. The NPTS data set provides information used to define relationships and rates describing travel behavior in urban, suburban, and rural settings for the general public, transit-dependent, and other demographic cohorts. The 1995 NPTS data set is used to produce trip rate goals for transit-dependent services. The categories are broken out by MSA Urban (those urban

areas within a Metropolitan Statistical Area), MSA Non-urban (those areas within a MSA but not urban), and Not MSA (non-urban or rural areas). The non-MSA areas are defined as those that have a population of less than 1,000 persons per square mile.

Discussion among the Advisory Committee members and the LSC Team led to applying a weighted value to the NPTS trip rates. The LSC Team presented and discussed the mobility gap concept and weighted trip rates to be used in the calculations.

Mobility Gap Calculations

Recognizing that zero-vehicle household trip rates are less than those for persons in households with vehicles, the goal for each area is to determine the level of transit service sufficient to fill the mobility gap between trip rates for persons in households with automobiles and those in households without.

Trip rates taken from the NPTS for the mountain and west north-central regions are provided below. NPTS data for Montana contained an insufficient number of records for rural households without vehicles to be statistically reliable.
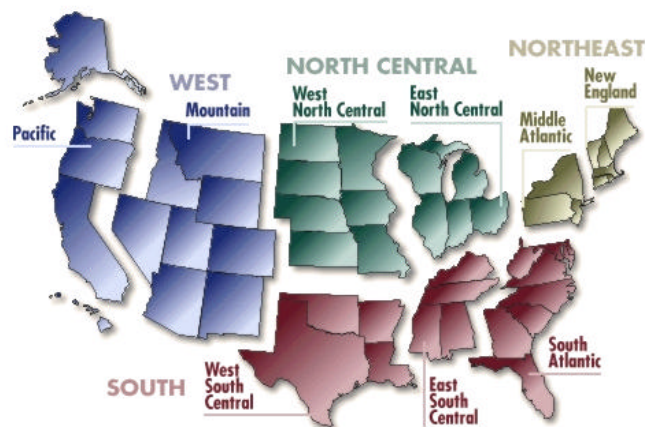
It must be noted that upon further investigation of readily available census data, the most appropriate data for use in generating goal trip rates are age of householder by vehicle availability in urban and rural locals. Without getting into Public Use Micro Sample data, which are not available generally except through a State Data Center, the available data for planners to use in making these estimates are the Census STF3 files. These files report age of householder by vehicle availability in terms of age 15-64 and age 65 and over and vehicles available in terms of zero and one or more. The target trip rates to be generated for each county will be reflective of these limitations.

The LSC Team and the Montana Advisory Committee discussed the mobility gap approach to be used to project the transit level of service and public transportation needs. This Final Report provides documentation of the methodology. The urban and rural rates provide the best data regarding differences in mobility between households with and without autos.

In particular, the mobility gap methodology is intended for use by officials from Montana agencies and jurisdictions using readily available data sources. Projecting future needs, demand, and operational requirements are the goals of the mobility gap methodology. To do so requires, as discussed above, making projections of demographic conditions with readily available data. Data such as the number of households where vehicles are fewer than workers by central city, urban-not-central city, and rural locale are not readily available. We, therefore, must rely on data that can be projected. The data used within this study are readily available and permit estimates of trip rates by urban or rural setting for households headed by persons 15-64 or 65 and over in households with zero or one or more vehicles.

Because household sizes are different for households with and without vehicles, the LSC Team developed an approach which adjusts for the difference in household sizes. This approach starts with the person-trip rate from the NPTS for those living in zero-vehicle households and those living in households with vehicles. These rates are shown in Table II-1. The weighted household size is calculated from the 1995 National Personal Transportation Survey (NPTS) data by dividing the expanded total number of people represented in the survey by the expanded number of households represented in the survey. Table II-2 shows the household sizes, which have been calculated using data from the Mountain and West North Central Census Sections.

Table II-1 Person-Trip Rates		
Category	**Zero-Vehicle Households**	**Households with Vehicles**
Age 65 +		
MSA Urban	2.61	3.83
MSA Non-urban	1.95	3.96
Not MSA	1.47	4.00
Age 15-64		
MSA Urban	2.57	4.53
MSA Non-urban	3.51	4.51
Not MSA	3.35	4.41
Source: 1995 NPTS, LSC 2000.		

Table II-2 Weighted Household Size		
Category	**Zero-Vehicle Households**	**Households with Vehicles**
Age 65 +		
MSA Urban	1.36	1.34
MSA Non-urban	1.08	1.69
Not MSA	1.05	1.68
Age 15-64		
MSA Urban	1.92	2.51
MSA Non-urban	1.81	2.86
Not MSA	2.06	2.86
Source: 1995 NPTS, LSC 2000.		

Household trip rates are calculated by multiplying the person-trip rate in Table II-1 by the household size (data in Table II-2). To adjust for the difference in household sizes, the person-trip rates for both households with and without vehicles are multiplied by the household size of households without vehicles. The difference in household size is shown for comparison, but the household size of households with vehicles is not included in the calculations. This provides a household rate for zero-vehicle households as if they had vehicles, but

with the same household size. Table II-3 shows the calculated weighted house-hold trip rates. The weighted trip rates are used in calculating the mobility gap for Montana counties.

Table II-3 Weighted Household Trip Rates		
Category	**Zero-Vehicle Households**	**Households with Vehicles**
Age 65 +		
MSA Urban	3.55	5.20
MSA Non-urban	2.10	4.27
Not MSA	1.54	4.19
Age 15-64		
MSA Urban	4.95	8.70
MSA Non-urban	6.36	8.17
Not MSA	6.90	9.07
Source: 1995 NPTS, LSC 2000.		

Table II-3 illustrates the 1995 NPTS daily trip rates used for Montana counties. The trips rates have been weighted to adjust for the household sizes and to provide a more precise demand estimate. In summary, the trip generation rates range from 1.54 for Not MSA, zero-vehicle households as the lowest to 9.07 as the highest trip rate for Not MSA households with vehicles. The NPTS data set recognizes that, in general, trip rates are higher for households with autos than those without autos. This data set also recognizes that, in general, trip rates are higher for age 15-64 households than for those households age 65 or older.

The trip rates used for the purposes of this study are the zero-vehicle household trip rates, which range from 1.54 to 6.90. The trip rates illustrate a pattern that those households over age 65 in urban MSA areas have the highest trip rate for zero-vehicle households in that age group. Non-MSA or rural households over age 65 with zero vehicles take less than half that many trips.

In contrast to the age 65+ households with zero vehicles, the households age 15-64 in rural or non-MSA areas have the highest trip rate. The 1995 data set

does not specifically state why this pattern exists. However, if one thinks of the lifestyle of an average non-MSA or rural household, then the trip rates may make sense. One member of the household may work in the agricultural sector making many trips from one point to another, while another member may work part-time in the closest local town or may have to take children back and forth to school.

After determining the trip rates for households with and without vehicles, the difference between the rates is defined as the mobility gap. These rates are again broken down by age (age 15-64 or age 65+). The gap between the trip rates would be the amount of transit service needed to allow equal mobility between households with zero vehicles and households with one or more vehicles.

Trip Rate (HH w/ Auto) - Trip Rate (HH w/out Auto) = **Mobility Gap**

Table II-4 uses the above mobility gap equation to illustrate the actual mobility gap for Montana.

Table II-4 Mobility Gap Trip Rates						
	Trip Generation Rates			**Trip Generation Rates**		
Category	**HH 15-64 w/o Veh Rate**	**HH 15-64 w/1+ Veh Rate**	**Mobility Gap**	**HH 65+ w/o Veh Rate**	**HH 65+ w/1+ Veh Rate**	**Mobility Gap**
Non-MSA	6.90	9.07	**2.17**	1.54	4.19	**2.65**
MSA Non-Urban	6.36	8.17	**1.81**	2.10	4.27	**2.17**
LSC & SG Associates, Inc. 2000						

The next step includes the generated mobility gap number multiplied by the number of households without autos. This equation determines the trip need to be served by a transit agency for a particular area.

Mobility Gap * (# of HH w/out Auto) = **Trip Need to be Served by Transit**

This approach establishes a level of transit need. There remains a policy issue of how much need is reasonable to meet. This policy is addressed later in the study after the mobility gap has been calculated for all of the counties in Montana.

DISABLED POPULATION NEEDS METHODOLOGY

The population segment with mobility impairments is frequently dependent on transit services. The definition of mobility-limited populations is:

MOBILITY LIMITATION POPULATION

Persons identified as having a mobility limitation if they have a health condition that has lasted for six months or more and which made it difficult to go outside the home alone. Such as: shopping and visiting the doctor's office. The term health condition refers to both physical and mental condition. A temporary health problem, such as a broken bone that is expected to heal normally is not considered a health condition.

1990 – Census Definition

This segment of the population is considered in the majority of transit needs methodologies. The recommended methodology for assessing transit needs for the disabled is to apply the TCRP methodology from Project B-3.

To use the TCRP methodology to identify a feasible maximum demand, it is necessary to assume a high supply level, as measured in vehicle-miles of annual transit service per square mile of service area. A review of the transit database presented in the TCRP documents indicates that 2,400 vehicle-miles per square mile per year is the upper-bound "density" of similar rural services

provided in this country. This assessment of demand for the rural areas, therefore, could be considered to be the maximum potential ridership if a high level of rural service were made available throughout the region.

The TCRP Methodology for rural areas was used to estimate demand for the disabled population. The rural demand estimation methodology uses the disabled population for 1990 as baseline data. The LSC Team used the service areas identified in the Provider Survey to provide a more accurate estimate of demand for the disabled population.

PROGRAM TRIPS

The TCRP demand methodology recommended for the disabled population also provides a methodology for the program-related trips for a region. Program-related trips are trips that would not occur but for the existence of specific social service program activities. The following text presents the methodologies and formulas in detail. The accepted TCRP methodology involves applying a trip rate per participant to the number of participants in each program to forecast the demand.

The LSC Team used the number of Head Start participants and mental health program participants by county to estimate the program-related trip demand.

The study of rural trip generation, conducted as part of the TCRP B-3 project, yielded nationwide data on the quality and quantity of transit service in rural areas as well as data on transit system use (annual trips), stratified by traveler characteristics. These characteristics included information about age, income, and mobility-limitation status. In addition, information was collected on the services available in rural counties. Service information included the amount of service provided (measured in terms of annual vehicle-miles), the size of the service area (measured in square miles), the type of service provided (demand-responsive, fixed-route, etc.), and the number of trips served (annual unlinked trips).

On a county-by-county basis, relationships between trips consumed and service provided were defined. This information was used to derive predictive equations

which relate service area and readily available population data with transit service level data to yield estimates of travel demand for program and non-program-related transit services. Trip rates for various programs are provided in Appendix B. Program-related trips are those trips made by participants of a specific human or social service program, such as senior nutrition or occupational therapy. These trips would not be made but for the existence of the program. The number of these trips is directly dependent on program enrollment. On the other hand, non-program trips are those trips, which are more reflective of general public transit service; trip purpose and traveler eligibility are not restrictive. Only those programs that apply in Montana and for which data may be obtained, were used. These included the following programs—Developmentally Disabled, Group Home, Head Start, Job Training, Mental Health Services, Nursing Homes, Senior Nutrition, Sheltered Workshops, and Meals on Wheels.

SUMMARY

A thorough analysis was conducted to determine if one demand methodology contained a commonality and if it is possible to develop an appropriate single methodology for all of Montana. The LSC Team did not find a common methodology to provide an accurate demand estimate. The vast transit differences and needs across the state did not permit one demand methodology to give an accurate and reliable estimate. Three methodologies were used in combination to give a good representation of the statewide needs. These methodologies are the mobility gap for general public transit needs, specific needs for the disabled, and program-related transportation needs.